# Claims

[c1] 1.A hydraulically controlled fan drive system for an engine comprising:
a housing assembly containing a hydraulic fluid within a fluid reservoir;
an input circuit capable of rotating said housing assembly at a given rotational speed;
a clutch plate assembly contained within said housing assembly;
a fan shaft coupled to said clutch plate assembly;
a fan coupled to said fan shaft;
a pitot tube coupled within said housing assembly and receiving at least a portion of said hydraulic fluid from said fluid reservoir at said given rotational speed, wherein said portion of hydraulic fluid defines a static pressure within said pitot tube at said given rotational speed;
a piston fluidically coupled with said pitot tube, said piston capable of moving towards and engaging said clutch plate assembly as a function of said static pressure, wherein the engagement of said clutch assembly causes said fan shaft and said fan to rotate in response; and
a fluid controller fluidically coupled between said pitot tube and said fluid reservoir, said fluid controller using a binary control strategy to control an amount of an engagement of said clutch plate assembly between a fully engaged clutch position, at least two partially engaged clutch positions, and a disengaged clutch position;
wherein said amount of said engagement controls the rotational speed of said fan used to maintain the engine at a desired operating temperature as a function of said given rotational speed.

[c2] 2.The fan drive system of claim 1, wherein said fluid controller comprises:
a spring loaded outer spool coupled within a main center channel of said housing assembly, said outer spool having a inner proportionating valve coupled within an outer spool body region and an outer proportionating valve coupled within an outer spool stepped region;
a spring loaded inner spool coupled within said outer spool, said inner

spool having an inner spool body region and an inner spool stepped region;
a first electrical coil coupled to said outer spool;
a second electrical coil coupled to said inner spool; and
a main controller coupled to said first electrical coil and coupled to said second electrical coil, said main controller capable of directing a first electrical charge through said first electrical coil and also capable of directing a second electrical charge through said second electrical coil as a function of said desired engine operating temperature at said given rotational speed;
wherein the electrical excitation of said first electrical coil causes said outer spool to move from a first position to a second position;
wherein the electrical excitation of said second electrical coil causes said inner spool to move from a third position to a fourth position.

[c3] 3.The fan drive system of claim 2, wherein said first position is defined such that said inner proportionating valve is fluidically coupled said pitot tube through a return valve.

[c4] 4.The fan drive system of claim 3, wherein said second position is defined such said outer proportionating valve is fluidically coupled with said pitot tube through a return valve.

[c5] 5.The fan drive system of claim 4, wherein said third position is defined such that said inner spool body region is closely coupled to said pitot tube through a return valve.

[c6] 6.The fan drive system of claim 5, wherein said fourth position is defined such that said inner spool stepped region is closely coupled to said pitot tube through a return valve.

[c7] 7.The fan drive of claim 6, wherein said Engaged clutch position is defined such that said outer spool is in said first position and such that

said inner spool is in said third position.

[c8] 8.The fan drive of claim 6, wherein said disengaged clutch position is defined such that said outer spool is in said second position and such that said inner spool is in said fourth position.

[c9] 9.The fan drive of claim 6, wherein a first partially engaged clutch position of said at least two partially engaged clutch positions is defined such that said outer spool is in said second position and such that said inner spool is in said third position.

[c10] 10.The fan drive of claim 9, wherein a second partially engaged clutch position of said at least two partially engaged clutch positions is defined such that said outer spool is in said first position and such that said inner spool is in said fourth position.

[c11] 11.The fan drive of claim 10, wherein said second partially engaged clutch position allows less rotation of said fan at said given rotational speed than said first partially engaged clutch position.

[c12] 12.The fan drive of claim 1, wherein said fluid controller comprises:
a main flow channel fluidically coupled to said pitot tube through a return valve;
a first flow channel fluidically coupled to said main flow channel and to said fluid reservoir;
a second flow channel fluidically coupled to said main flow channel and to said fluid reservoir;
a first valve coupled to said first flow channel, said first valve capable of movement from a first open position to a first closed position, wherein said first open position allows a flow of said portion of said hydraulic fluid from said pitot tube through said main flow channel and said first flow channel to said fluid reservoir and wherein said first closed position prevents the flow of said hydraulic fluid through said second flow

channel;

a second valve coupled to said second flow channel, said second valve capable of movement from a second open position to a second closed position, wherein said second open position allows a flow of said portion of said hydraulic fluid from said pitot tube through said main flow channel and said second flow channel to said fluid reservoir and wherein said second closed position prevents the flow of said hydraulic fluid through said second flow channel; and

a main controller electrically coupled to said first valve and said second valve, said main controller capable of electrically actuating said first valve from said first closed position to said first open position; said main controller also capable of electrically actuating said second valve from said second closed position to said first closed position.

[c13] 13.The fan drive system of claim 12, wherein said engaged clutch position is defined wherein said first valve is in said first closed position and wherein said second valve is said second closed position.

[c14] 14.The fan drive system of claim 12, wherein said disengaged clutch position is defined wherein said first valve is in said first open position and wherein said second valve is said second open position.

[c15] 15.The fan drive system of claim 12, wherein a first partially engaged clutch position of said at least two partially engaged clutch positions is defined wherein said first valve is in said first open position and said second valve is in said second closed position.

[c16] 16.The fan drive system of claim 15, wherein a second partially engaged clutch position of said at least two partially engaged clutch positions is defined wherein said first valve is in said first closed position and said second valve is in said second open position.

[c17] 17.The fan drive system of claim 16, wherein said second partially

engaged clutch position allows less rotation of said fan at said given rotational speed than said first partially engaged clutch position.

[c18] 18.The fan drive system of claim 12, wherein said fluid controller further comprises a first restrictor coupled within said first main channel.

[c19] 19.The fan drive system of claim 18, wherein said fluid controller further comprises a second restrictor coupled within said second main channel, wherein said second restrictor allows less rotation of said fan at said given rotational speed than said first restrictor.

[c20] 20.A method for controlling the engagement of a clutch pack used to drive a fan in a hydraulically controlled fan drive system to maintain an engine at an ideal operating temperature at a given pulley rotational speed, the fan system having an engagement circuit coupled to the pulley and driven by static pressure with a pitot tube at the given rotational speed, the method comprising:
coupling a fluid controller between the pitot tube and a fluid reservoir, said fluid controller having a fully engaged clutch position, a fully disengaged clutch position, and at least two partially engaged clutch positions;
electrically coupling a main controller to said fluid controller, said main controller capable of controlling the temperature of the engine at the given pulley rotational speed; and
directing an electrical signal from said main controller to said fluid controller as a function of the engine temperature at the given pulley rotational speed, wherein said fluid controller interprets said electrical signal to move from a first position to a second position;
wherein said first position selected from the group consisting of said fully engaged clutch position, said fully disengaged clutch position, and said at least two partially engaged clutch positions and wherein said first position selected from the group consisting of said fully engaged clutch

position, said fully disengaged clutch position, and said at least two partially engaged clutch positions.

[c21] 21.The method of claim 20, wherein said fully engaged clutch position is such that the fan rotates at a maximum rotational speed and wherein said disengaged is such that the fan rotates at a minimum rotational speed at the given pulley rotational speed.

[c22] 22.The method of claim 21, wherein one of said at least two partially engaged clutch positions is such that the fan rotates at a first speed and wherein another of said at least two partially engaged clutch position is such that the fan rotates at a second speed, wherein said second speed is greater than said first speed and wherein said first speed and said second speed rotate at a speed between said minimum speed and said maximum speed of the fan at the given pulley rotational speed.